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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/549,368	04/14/2000	Thomas J. Endres	1172	8245

7590 07/02/2003

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EXAMINER

YEH, EDITH M

ART UNIT PAPER NUMBER

2634

DATE MAILED: 07/02/2003

5

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	09/549,368	ENDRES ET AL.
	Examiner	Art Unit
	Edith M Yeh	2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 04 April 2000.

2a) This action is FINAL.                            2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-35 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-35 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \* c) None of:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

1) Notice of References Cited (PTO-892)                            4) Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)                            5) Notice of Informal Patent Application (PTO-152)

3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.

6) Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 4 is objected to because of the following informalities: the term “the least means square error” first time used in the claim does not have antecedence in this claim and its parent claims to indicate there is a LMS. It suggests changing it to “a least means square error”.

Appropriate correction is required.

2. Claims 15 & 16 are objected to because of the following informalities” the term “An apparatus in accordance with claim 4,” should be “An apparatus in accordance with claim 14.”

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 1, 11, & 21** are rejected under 35 U.S.C. 102(b) as being anticipated by Gozzo (US Patent 5513214).

Gozzo discloses a communications receiver having a decision feedback equalizer filter (FIG.2), the receiver having an input filter (110 FIG.2) responsive to the received signal to form soft decision samples (120 FIG.1), and a slicer responsive to the received signal to form hard decision samples (140 FIG.2), the soft decision samples and the hard decision samples

comprising a series of individual signal samples (FIG.1 & 2), a equalizer filter arrangement, and its method for operating the decision feedback equalizer filter comprising: means and method of operating the decision feedback equalizer filter in a first mode by coupling the soft decision samples to the decision feedback equalizer filter by the first switch (120, 130-LFE, 170 FIG.2); means and method of operating the decision feedback equalizer filter in a second mode by coupling the hard decision samples to the decision feedback equalizer filter by the second switch (120, 130-DFE, 170 FIG.2); and switching (130, 150 FIG.2) between first and second modes on an individual signal sample basis by a switch control (Abstract).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2-3 & 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gozzo (US Patent 5513214) in view of Scarpa et al. (US Patent 5673293).

Regarding claims 2 & 12, Gozzo does not specify the first quality level of the soft decision mode is less than the second quality level of the hard decision. However Scarpa et al. teaches the two levels where the constellation determination between the soft decision and hard decision based on the received signal sample falls inside the box or outside the box, wherein the hard decision is in side the box/threshold (column 7 lines 30-45; 130, 156 FIG.1). At the time of

the invention, it would have been obvious to a person of ordinary skill in the art to have Scarpa et al.'s teaching in the Gozzo's equalizer that the hard decision is closer to the point having less error margin and greater quality signal sample than the soft decision, to have an efficient way for demodulating amplitude modulation (column 3 lines 5-10).

Regarding **claims 3 & 13**, further Scarpa et al. teaches the signal sample is at a first quality level when outside a box, at a second quality level when inside box. The box is centered about the origin of the complex plane (column 7 lines 30-45). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have Scarpa et al.'s teaching in the Gozzo's equalizer to have an efficient way for demodulating amplitude modulation (column 3 lines 5-10).

7. Claims 9-10, 19-20, 22-25, 27-32 & 34-35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gozzo (US Patent 5513214) in view of Paik et al. (US Patent 5363408).

Regarding **claims 9 & 19**, Gozzo does not explicitly specify the apparatus and method whereby first mode is a signal acquisition mode, using the soft decision samples and the constant modulus algorithm (CMA), to update the error. However Paik et al. teaches the CMA in the acquisition mode (80 FIG.6, FIG.9; column 8 lines 42-55, 65-67). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the CMA in the acquisition taught by Paik et al. in Gozzo's equalizer' s first mode to deal the ISI problem (column 1 lines 45-60).

Regarding **claims 10 & 20**, Gozzo does not explicitly specify the apparatus and method whereby the second mode is a signal tracking mode, using the hard decision samples and the least means squared (LMS) algorithm, to update the error. However Paik et al. teaches the

Decision Directed (DD-MSL) in the tracking mode (80 FIG.6, FIG.9; column 8 lines 58-60, column 8 line 67-column 9 line 1). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the LMS algorithm in the tracking taught by Paik et al. in Gozzo's equalizer' s second mode to deal the ISI problem (column 1 lines 45-60).

Regarding **claims 28 & 35**, Gozzo does not specify the algorithm used in each mode. However Paik et al. teaches the samples stored in the CMA PROM as the CMA used in one mode (132 FIG.9), and the samples stored in the LMS PROM (134 FIG.9) as the LMS used in the other mode. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Paik et al.'s teaching in the Gozzo's equalizer where the CMA in the first mode with soft decision (130-LFE FIG.2 '214) and LMS algorithm in the second mode with hard decision (130-DFE FIG.2 '214) to deal the ISI problem (column 1 lines 45-60).

Regarding **claims 22-23, & 29-30**, Gozzo does not specify the algorithm used in the one mode (as the first mode) of the two modes. However Paik et al. teaches the samples stored in the CMA PROM as the CMA used in one mode (132 FIG.9). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Paik et al.'s teaching in the Gozzo's equalizer where the CMA as the first mode (130-LFE FIG.2 '214) of the two modes to deal the ISI problem (column 1 lines 45-60).

Regarding **claims 24 & 31**, Gozzo does not specify the algorithm used in the one mode (as the first mode) of the two modes as the LMS. However Paik et al. teaches the first mode is a LMS (column 8 lines 45-50). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Paik et al.'s teaching in the Gozzo's equalizer

where the LMS as the first mode of the two modes to deal the ISI problem (column 1 lines 45-60).

Regarding **claims 25, 27, 32, & 34**, Gozzo discloses the algorithm used in the one mode (the second mode) of the two modes is the LMS (Abstract, column 5 lines 10-15).

8. **Claims 26 & 33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gozzo (US Patent 5513214) in view of Paik et al. (US Patent 5363408), further in view of Takeuchi et al. (US Patent 6289046 B1).

Further Takeuchi et al. teaches the CMA used in the hard decision i.e. the second mode (24, 37 FIG.2; column 7 lines 34-39, column 9 lines 30-35). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the CMA taught by Takeuchi et al. in the Gozzo's equalizer hard decision mode to remove the ISI (column 1 lines 9-20).

9. **Claims 4-6, 14-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gozzo (US Patent 5513214) in view of Scarpa et al. (US Patent 5673293), further in view of Paik et al. (US Patent 5363408).

Regarding **claims 4 & 14**, Gozzo does not specify the signal sample is at a first quality level when outside a box, at a second quality level when inside box, and the box is center about the origin of the complex plane, and the least means square error is below a threshold t.

Further Scarpa et al. teaches the signal sample is at a first quality level when outside a box, at a second quality level when inside box, and the box is center about the origin of the complex plane (column 7 lines 30-45). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the signal sample is at a first quality level when

outside a box, at a second quality level when inside box, and the box is center about the origin of the complex plane taught by Scarpa et al. in Gozzo's equalizer to have a efficient way for demodulating amplitude modulation (column 3 lines 5-10)

Further Paik et al. teaches the least means square error of the individual signal sample is below a threshold (column 1 lines 50-60, column 8 lines 3-10, lines 45-66). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the least square error of the individual signal sample is below a threshold taught by Paik et al. in Gozzo's equalizer to have a flexible M-ary QAM communication system (column 1 lines 5-10).

Regarding **claims 5 & 15**, further Paik et al. teaches the threshold  $t$  is represented as a reliability area comprising a circle in the complex plane (column 8 lines 58-65). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have this teaching taught by Paik et al. in Gozzo's equalizer to have a reliable and bandwidth efficient system (column 1 lines 45-60).

Regarding **claims 6 & 16**, further Paik et al. teaches the threshold  $t$  is represented as a reliability area comprising a square in the complex plane (column 8 lines 50-57). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have this teaching taught by Paik et al. in Gozzo's equalizer to have a reliable and bandwidth efficient system (column 1 lines 45-60).

10. **Claims 7-8, & 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gozzo (US Patent 5513214) in view of Scarpa et al. (US Patent 5673293), further in view of Paik et al. (US Patent 5363408) and Gardner et al. (US Patent 5848105).

Gozzo does not teach the reliability area i.e. the width w of the box/ the threshold is adaptive based on the qualities of a block of past signal samples. However Gardner et al. teaches the threshold/reliability area/width of the box is adaptive based on the qualities of a block of past signal samples (column 18 lines 15-60, column 19 lines 10-30). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have this teaching taught by Gardner et al. to have a method for rejecting interference (column 3 line 65-column 4 line 5).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith M Yeh whose telephone number is 703-305-3416. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4800.

Edith Yeh  
June 27, 2003



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